

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§		
Guo-Xin Jin et al.	§	Examiner:	Helene Klemanski
	§		
Serial No.: 10/692,900	§	Group Art Unit:	1755
	§		
Filed: October 24, 2003	§	Docket No:	2002B148B/2
	§		
For: Polymerized Catalyst Composition	§	Confirmation No.:	8713
	§		
	§	Date:	August 10, 2007

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.131

We, Zerong Lin, Robert J. Wittenbrink and Chang-Kun Liu, declare as follows:

1. We are the inventors of the subject application and one of the authors of the attached Exhibit A.
2. Exhibit A is a copy of a patent memorandum that we and others submitted to the ExxonMobil Chemical Company Patent Department as part of an invention disclosure that forms the basis of the present application. The patent memorandum indicates conception and reduction to practice of the claimed invention before June 5, 2002. All masked dates in Exhibit A are prior to June 5, 2002.
3. The subject matter of Exhibit A was diligently prepared and filed as U.S. Patent Application Serial No. 10/692,900 beginning at a time prior to June 5, 2002, until the filing of priority applications: USSN 60/421,282 filed October 25, 2002; USSN 60/421,163 filed October 25, 2002 and USSN 60/421,164 filed October 25, 2002.
4. Exhibit A shows that the invention, which forms the subject matter of the pending claims in the above-captioned patent application, was conceived in the United States, specifically

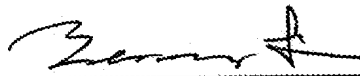
in the State of Texas, before June 5, 2002, and diligently reduced to practice in the United States by at least October 25, 2002, the filing date of the U.S. priority provisional applications: 60/421,282; 60/421,163; and 60/421,164.

5. Exhibit A includes a description of pyridine diimine complexes, as recited in, for example, claim 1. More particularly, Exhibit A includes a description of bis-[1-(2,6-diisopropylphenylimino) ethyl]-6-[1-(4-allyl-2,6-diisopropyl phenylimino) ethyl] pyridine iron dichloride, as recited in claim 1. (*See, Exhibit A, pages 1-2.*)

6. Exhibit A is offered as supporting evidence that the compounds of the present invention were conceived in the United States before June 5, 2002, the earliest publication date amongst Jin et al. (CN Patent Application No. 1352204A) and Liu et al. ("Polymer-Incorporated Iron Catalysts for Ethylene Polymerization," which published on August 20, 2002), and diligently reduced to practice by filing the priority applications on October 25, 2002.

We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

8/10/2007
Date


Zerong Lin

Date

Robert J. Wittenbrink

Date

Chang-Kun Liu

EXHIBIT A

PATENT MEMORANDUM

EXXON CHEMICAL COMPANY

PATENT COMMITTEE

STATUS OF INVENTION (EXISTING OR CONTEMPLATED EXPERIMENTAL, COMMERCIAL OR PLANT SCALE USE)

Experimental

DATE OF FIRST USE, PUBLICATION, AND/OR SALE

WERE YOU WORKING FULL OR PART TIME ON ANY GOVERNMENT CONTRACT AT OR WITHIN ONE YEAR PRIOR TO THE TIME THE INVENTION WAS FIRST CONCEIVED OR TESTED?

YES NO

CO. TRACT NO. (S)

FIRST WRITTEN DESCRIPTION

DATE

FIRST SKETCH OR DRAWING

DATE

FIRST DISCLOSURE TO OTHERS

DATE

TO WHOM AND WHERE

DATE

DETAILED DESCRIPTION OF INVENTION (SEE INSTRUCTIONS ON REVERSE SIDE)

The inventive polymerized late transition metal catalysts are prepared by copolymerizing Fe(II) or Co(II) pyridine diimine complexes containing polymerizable olefinic substituents on aryl groups with an olefin such as styrene in the presence of a radical initiator (e.g., AIBN). Divinyl benzene is optionally added for cross-linking.

With MAO as a co-catalyst, the polymerized late transition metal catalysts can be used for ethylene polymerization. The data in Table 1 demonstrate that polymerized Fe catalyst I has higher catalyst activity and produces PE with higher MW.

The inventive polymerized late transition metal catalysts can be used for olefin polymerization or oligomerization

Preparation of Polymerized Late-transition metal (Fe) catalyst (II)

A solution containing Bis-[1-(2,6-diisopropylphenylimino) ethyl]-6-[1- (4-allyl-2,6- diisopropyl phenylimino) ethyl] pyridine Iron Dichloride (I) (0.50g, 0.77 mmol), styrene (4ml) and AIBN (0.06g) in 50ml toluene was kept at 80°C for 7hrs. The resulting solution was evaporated and residue was washed with dried mixture solution of hexane and toluene (2:1). The solid polymer product was collected.

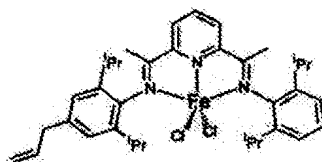
Ethylene polymerization using catalysts(II) in the presence of MMAO in the solution of toluene under the condition of 1 atmosphere of ethylene were investigated. The results of ethylene polymerization were summarized:

The Result of Ethylene Polymerization'				
catalyst	T(°C)	n(AI)/n(Fe) (molar ratio)	10 ⁴ Activity (g PE / mol Fe.h)	10 ⁴ M _n
II	13	550	1.033	15.74
		1100	2.145	15.32
		1650	2.233	11.17
		2200	2.446	6.29
		2750	2.315	7.33
		3300	1.912	6.25
	-15	2200	5.948	20.59
	0		4.508	20.11
	30		2.112	5.46
	45		1.314	4.92
	60		0.725	4.86

EXHIBIT A

Table 1. Polymerized Fe Catalyst I for Ethylene Polymerization

Catalyst	Activity, 10^6 g PE/(mol M \cdot atm \cdot hr)	MW
I	4.1	8.9×10^4
Polymerized I	6.2	1.3×10^5



I

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§		
Guo-Xin Jin et al.	§	Examiner:	Helene Klemanski
	§		
Serial No.: 10/692,900	§	Group Art Unit:	1755
	§		
Filed: October 24, 2003	§	Docket No:	2002B148B/2
	§		
For: Polymerized Catalyst Composition	§	Confirmation No.:	8713
	§		
	§	Date:	August 10, 2007

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.131

We, Zerong Lin, Robert J. Wittenbrink and Chang-Kun Liu, declare as follows:

1. We are the inventors of the subject application and one of the authors of the attached Exhibit A.
2. Exhibit A is a copy of a patent memorandum that we and others submitted to the ExxonMobil Chemical Company Patent Department as part of an invention disclosure that forms the basis of the present application. The patent memorandum indicates conception and reduction to practice of the claimed invention before June 5, 2002. All masked dates in Exhibit A are prior to June 5, 2002.
3. The subject matter of Exhibit A was diligently prepared and filed as U.S. Patent Application Serial No. 10/692,900 beginning at a time prior to June 5, 2002, until the filing of priority applications: USSN 60/421,282 filed October 25, 2002; USSN 60/421,163 filed October 25, 2002 and USSN 60/421,164 filed October 25, 2002.
4. Exhibit A shows that the invention, which forms the subject matter of the pending claims in the above-captioned patent application, was conceived in the United States, specifically

in the State of Texas, before June 5, 2002, and diligently reduced to practice in the United States by at least October 25, 2002, the filing date of the U.S. priority provisional applications: 60/421,282; 60/421,163; and 60/421,164.

5. Exhibit A includes a description of pyridine diimine complexes, as recited in, for example, claim 1. More particularly, Exhibit A includes a description of bis-[1-(2,6-diisopropylphenylimino) ethyl]-6-[1-(4-allyl-2,6-diisopropyl phenylimino) ethyl] pyridine iron dichloride, as recited in claim 1. (*See, Exhibit A*, pages 1-2.)


6. Exhibit A is offered as supporting evidence that the compounds of the present invention were conceived in the United States before June 5, 2002, the earliest publication date amongst Jin et al. (CN Patent Application No. 1352204A) and Liu et al. ("Polymer-Incorporated Iron Catalysts for Ethylene Polymerization," which published on August 20, 2002), and diligently reduced to practice by filing the priority applications on October 25, 2002.

We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date

Zerong Lin

8/10/7
Date


Robert J. Wittenbrink

Date

Chang-Kun Liu

EXHIBIT A

PATENT MEMORANDUM

EXXON CHEMICAL COMPANY		INVENTOR(S) Robert J. Wittenbrink, Guo-Xin Jin, Zerong Lin, Chang-Kun Liu		DATE FOR MEMO NO. PM 2001101	
PATENT COMMITTEE		EXACT DESCRIPTIVE TITLE Polymerized Late Transition Metal Catalyst			
STATUS OF INVENTION (EXISTING OR CONTEMPLATED EXPERIMENTAL, COMMERCIAL, OR PLANT SCALE USE)		BRIEF ABSTRACT OF INVENTION Copolymerization of Fe(II) or Co(II) pyridine diimine complexes containing olefinic substituents on aryl groups with styrene in the presence of a radical initiator results in polymerized late transition metal catalysts which can be used for olefin polymerization or oligomerization. These catalysts have high catalyst activity for olefin polymerization or oligomerization.			
Experimental		FOR LAW-TECHNOLOGY DEPARTMENT USE ONLY			
DATE OF FIRST USE, PUBLICATION, AND/OR SALE		DATE RECEIVED DATE		ATTORNEY'S INIT. BAC	
WERE YOU WORKING FULL OR PART TIME ON ANY GOVERNMENT CONTRACT AT, OR WITHIN ONE YEAR PRIOR TO THE TIME THE INVENTION WAS FIRST CONCEIVED OR TESTED?		DATE RECEIVED DATE			
r YES r NO CO- INVENTOR(S)		DATE OF FIRST TEST			
FIRST WRITTEN DESCRIPTION		HEREWITH OR FILED AT		WHERE RECORDED IN MEMOBOOK	
DATE		DATE		DATE	
FIRST SKETCH OR DRAWING		HEREWITH OR FILED AT		COMPANY REPORTS, FILE MEMO, PMS RELATED TO INVENTION (IDENTIFY)	
DATE		DATE		DATE	
FIRST DISCLOSURES TO OTHERS		TO WHOM AND WHERE		IS MODEL OR PROTOTYPE AVAILABLE?	
DATE		DATE		r YES r NO	

DETAILED DESCRIPTION OF INVENTION (SEE INSTRUCTIONS ON REVERSE SIDE)

The inventive polymerized late transition metal catalysts are prepared by copolymerizing Fe(II) or Co(II) pyridine diimine complexes containing polymerizable olefinic substituents on aryl groups with an olefin such as styrene in the presence of a radical initiator (e.g., AIBN). Divinyl benzene is optionally added for cross-linking.

With MAO as a co-catalyst, the polymerized late transition metal catalysts can be used for ethylene polymerization. The data in Table 1 demonstrate that polymerized Fe catalyst I has higher catalyst activity and produces PE with higher MW.

The inventive polymerized late transition metal catalysts can be used for olefin polymerization or oligomerization

Preparation of Polymerized Late-transition metal (Fe) catalyst (II)

A solution containing Bis-[1-(2,6-diisopropylphenyl)imino] ethyl [1-(4-allyl-2,6-diisopropyl phenylimino) ethyl] pyridine Iron Dichloride (I) (0.50g, 0.77 mmol), styrene (4ml) and AIBN (0.06g) in 50ml toluene was kept at 80°C for 7hrs. The resulting solution was evaporated and residue was washed with dried mixture solution of hexane and toluene (2:1). The solid polymer product was collected.

Ethylene polymerization using catalysts(II) in the presence of MMAO in the solution of toluene under the condition of 1 atmosphere of ethylene were investigated. The results of ethylene polymerization were summarized:

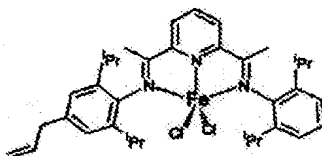
The Result of Ethylene Polymerization

catalyst	T(°C)	n(Al):n(Fe) (molar ratio)	10 ⁴ Activity (g PE / mol Fe.h)	10 ⁴ M _n
II	13	550	1.033	15.74
		1100	2.145	13.32
		1650	2.233	11.17
		2200	2.446	6.29
		2750	2.315	7.33
		3300	1.912	6.35
	-15	2200	5.948	20.59
	0		4.500	20.11
	30		2.112	5.46
	45		1.314	4.92
	60		0.725	4.86

EXHIBIT A

Table 1. Polymerized Fe Catalyst I for Ethylene Polymerization

Catalyst	Activity, 10^6 g PE/(mol M \cdot atm \cdot hr)	MW
I	4.1	8.9×10^4
Polymerized I	6.2	1.3×10^5



I

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
Guo-Xin Jin et al.	§	Examiner: Helene Klemanski
	§	
Serial No.: 10/692,900	§	Group Art Unit: 1755
	§	
Filed: October 24, 2003	§	Docket No: 2002B148B/2
	§	
For: Polymerized Catalyst Composition	§	Confirmation No.: 8713
	§	
	§	
	§	Date: August 10, 2007

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.131

I, Guo-Xin Jin, declare as follows:

1. I am one of the inventors of the subject application and one of the authors of the attached Exhibit A.
2. Exhibit A is a copy of a patent memorandum that I and others submitted to the ExxonMobil Chemical Company Patent Department as part of an invention disclosure that forms the basis of the present application. The patent memorandum indicates conception and reduction to practice of the claimed invention before June 5, 2002. All masked dates in Exhibit A are prior to June 5, 2002.
3. The subject matter of Exhibit A was diligently prepared and filed as U.S. Patent Application Serial No. 10/692,900 beginning at a time prior to June 5, 2002, until the filing of priority applications: USSN 60/421,282 filed October 25, 2002; USSN 60/421,163 filed October 25, 2002 and USSN 60/421,164 filed October 25, 2002.
4. Exhibit A shows that the invention, which forms the subject matter of the pending claims in the above-captioned patent application, was conceived in the United States, specifically

PATENT

in the State of Texas, before June 5, 2002, and diligently reduced to practice in the United States by at least October 25, 2002, the filing date of the U.S. priority provisional applications: 60/421,282; 60/421,163; and 60/421,164.

5. Exhibit A includes a description of pyridine diimine complexes, as recited in, for example, claim 1. More particularly, Exhibit A includes a description of bis-[1-(2,6-diisopropylphenylimino) ethyl]-6-[1-(4-allyl-2,6-diisopropyl phenylimino) ethyl] pyridine iron dichloride, as recited in claim 1. (*See, Exhibit A*, pages 1-2.)

6. Exhibit A is offered as supporting evidence that the compounds of the present invention were conceived in the United States before June 5, 2002, the earliest publication date amongst Jin et al. (CN Patent Application No. 1352204A) and Liu et al. ("Polymer-Incorporated Iron Catalysts for Ethylene Polymerization," which published on August 20, 2002), and diligently reduced to practice by filing the priority applications on October 25, 2002.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

13. 08. 2007
Date

Guo-Xin Jin
Guo-Xin Jin

EXHIBIT A

PATENT MEMORANDUM

EXXON CHEMICAL COMPANY

INVENTOR(S)

Robert J. Wittenbrink, Guo-Xin Jin, Zerong Lin, Chang-Kun Liu

DIVISION MEMO NO.

PM2001101

EXACT DESCRIPTIVE TITLE

Polymerized Late Transition Metal Catalyst

BRIEF ABSTRACT OF INVENTION

Copolymerization of Fe(II) or Co(II) pyridine diimine complexes containing olefinic substituents on aryl groups with styrene in the presence of a radical initiator results in polymerized late transition metal catalysts which can be used for olefin polymerization or oligomerization. These catalysts have high catalyst activity for olefin polymerization or oligomerization.

PATENT COMMITTEE

STATUS OF INVENTION: (CHECKING OR CONTEMPLATED EXPERIMENTAL, COMMERCIAL OR PLANT SCALE USE)

Experimental

DATE OF FIRST USE, PUBLICATION, AND/OR SALE

WERE YOU WORKING FULL OR PART TIME ON ANY GOVERNMENT CONTRACT AT, OR WITHIN ONE YEAR PRIOR TO THE TIME THE INVENTION WAS FIRST CONCEIVED OR TESTED?

YES

NO

CO

TRACT NO(S)

FOR LAW TECHNOLOGY DEPARTMENT USE ONLY

DATE RECEIVED

DATE

ATTORNEY'S RPT.

DATE OF FIRST TEST

WHERE RECORDED? (SEE INSTRUCTIONS)

FIRST WRITTEN DESCRIPTION

HEREWITH OR FILED AT

DATE

FIRST SKETCH OR DRAWING

HEREWITH OR FILED AT

DATE

FIRST DISCLOSED TO OTHERS

TO WHOM AND WHERE

COMPANY REPORTS, FILE MEMO, PMS RELATED TO INVENTION (IDENTIFY)

IS MODEL OR PROTOTYPE AVAILABLE?

YES

NO

DATE

DETAILED DESCRIPTION OF INVENTION (SEE INSTRUCTIONS ON REVERSE SIDE)

The inventive polymerized late transition metal catalysts are prepared by copolymerizing Fe(II) or Co(II) pyridine diimine complexes containing polymerizable olefinic substituents on aryl groups with an olefin such as styrene in the presence of a radical initiator (e.g., AIBN). Divinyl benzene is optionally added for cross-linking.

With MAO as a co-catalyst, the polymerized late transition metal catalysts can be used for ethylene polymerization. The data in Table 1 demonstrate that polymerized Fe catalyst I has higher catalyst activity and produces PE with higher MW.

The inventive polymerized late transition metal catalysts can be used for olefin polymerization or oligomerization.

Preparation of Polymerized Late-transition metal (Fe) catalyst (II)

A solution containing Bis-[1-(2,6-diisopropylphenyl)imino] ethyl]-6-[1-(4-allyl-2,6-diisopropyl phenyl)imino] ethyl] pyridine Iron Dichloride (I) (0.50g, 6.77 mmol), styrene (4ml) and AIBN (0.06g) in 50ml toluene was kept at 80°C for 7hrs. The resulting solution was evaporated and residue was washed with dried mixture solution of hexane and toluene (2:1). The solid polymer product was collected.

Ethylene polymerization using catalysts(II) in the presence of MMAO in the solution of toluene under the condition of 1 atmosphere of ethylene were investigated. The results of ethylene polymerization were summarized:

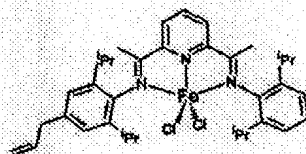
The Result of Ethylene Polymerization

catalyst	T(°C)	n(Al)/n(Fe) (molar ratio)	10 ⁴ Activity (g PE / mol Fe.h)	10 ⁴ M _n
II	13	550	1.033	15.74
		1100	2.145	15.33
		1650	2.233	11.17
		2200	2.440	6.39
		2750	2.315	7.33
		3200	1.912	6.25
	2200	+15	5.948	20.39
		0	4.500	20.11
		30	2.112	5.46
		45	1.314	4.92
		60	0.723	4.86

EXHIBIT A

Table 1. Polymerized Fe Catalyst I for Ethylene Polymerization

Catalyst	Activity, 10^5 g PE/(mol M \cdot atm \cdot hr)	MW
I	4.1	5.9×10^4
Polymerized I	6.2	1.3×10^5



I

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§		
Guo-Xin Jin et al.	§	Examiner:	Helene Klemanski
	§		
Serial No.: 10/692,900	§	Group Art Unit:	1755
	§		
Filed: October 24, 2003	§	Docket No:	2002B148B/2
	§		
For: Polymerized Catalyst Composition	§	Confirmation No.:	8713
	§		
	§	Date:	August 10, 2007
	§		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. §1.131

We, Zerong Lin, Robert J. Wittenbrink and Chang-Kun Liu, declare as follows:

1. We are the inventors of the subject application and one of the authors of the attached Exhibit A.
2. Exhibit A is a copy of a patent memorandum that we and others submitted to the ExxonMobil Chemical Company Patent Department as part of an invention disclosure that forms the basis of the present application. The patent memorandum indicates conception and reduction to practice of the claimed invention before June 5, 2002. All masked dates in Exhibit A are prior to June 5, 2002.
3. The subject matter of Exhibit A was diligently prepared and filed as U.S. Patent Application Serial No. 10/692,900 beginning at a time prior to June 5, 2002, until the filing of priority applications: USSN 60/421,282 filed October 25, 2002; USSN 60/421,163 filed October 25, 2002 and USSN 60/421,164 filed October 25, 2002.
4. Exhibit A shows that the invention, which forms the subject matter of the pending claims in the above-captioned patent application, was conceived in the United States, specifically

PATENT

in the State of Texas, before June 5, 2002, and diligently reduced to practice in the United States by at least October 25, 2002, the filing date of the U.S. priority provisional applications: 60/421,282; 60/421,163; and 60/421,164.

5. Exhibit A includes a description of pyridine diimine complexes, as recited in, for example, claim 1. More particularly, Exhibit A includes a description of bis-[1-(2,6-diisopropylphenylimino) ethyl]-6-[1-(4-allyl-2,6-diisopropyl phenylimino) ethyl] pyridine iron dichloride, as recited in claim 1. (*See, Exhibit A*, pages 1-2.)

6. Exhibit A is offered as supporting evidence that the compounds of the present invention were conceived in the United States before June 5, 2002, the earliest publication date amongst Jin et al. (CN Patent Application No. 1352204A) and Liu et al. ("Polymer-Incorporated Iron Catalysts for Ethylene Polymerization," which published on August 20, 2002), and diligently reduced to practice by filing the priority applications on October 25, 2002.

We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

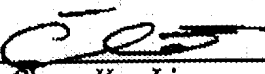
Date

Zerong Lin

Date

Robert J. Wittenbrink

09/07/2007
Date



Chang-Kun Liu